

# PATENT ABSTRACTS OF JAPAN

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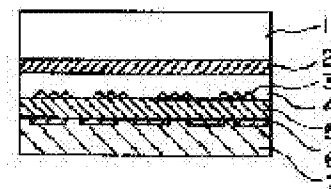
MATSUDAIRA OSAHISA

## (54) BIODECOMPOSABLE HOLOGRAM BRITTLE SEAL

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a biodecomposable hologram brittle seal which is a hologram brittle seal capable of preventing the resticking of a hologram seal by in illicit peeling action, particularly, hardly discovers the layer liable to partial brittle breakdown, is made completely non-reproducible by peeling and facilitates a treatment for discarding.

SOLUTION: The surface of a film (base) 1 which is transparent and has biodecomposability (consists essentially of a copolymer of polylactic acid having a number average mol.wt. of 10,000 to 100,000 and oxycarboxylic acid) is successively provided with at least a release layer 2, a transparent hologram forming layer 4 having hologram patterns 3, a reflective thin-film layer 5, a brittle release layer 6 which covers at least a part of the reflective thin-film layer and an adhesive layer 7.



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## CLAIMS

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[Claim(s)]

[Claim 1]It is transparent and has biodegradability (a number average molecular weight uses as the main ingredients a copolymer of polylactic acid which is 10,000-100,000, and hydroxy acid). On the film (base material) 1, A biodegradable hologram brittleness seal forming the wrap brittleness stratum disjunctum 6 and the glue line 7 one by one at least for at least a part of stratum disjunctum 2, the transparent hologram formation layer 4 and the reflexivity thin film layer 5 which have the hologram pattern 3, and said reflexivity thin film layer.

[Claim 2]A biodegradable hologram brittleness seal comprising:

It is the reflexivity thin film layer 5 on the polylactic acid film (base material) 1 which fabricates the hologram pattern 3 to one field and which is transparent and has biodegradability.

They are the wrap brittleness stratum disjunctum 6 and the glue line 7 in said at least a part of reflexivity thin film layer.

[Claim 3]The biodegradable hologram brittleness seal according to claim 1, wherein the transparent hologram formation layer 4 which has said hologram pattern 3 consists of solvent solubility biodegradable resin.

[Claim 4]The biodegradable hologram brittleness seal according to claim 1 or 2 forming the printing layer 8 in a field of either of the polylactic acid films 1 which has biodegradability by said transparency.

[Claim 5]The biodegradable hologram brittleness seal according to claim 1 forming the printing layer 8 in one field of said hologram formation layers 4.

[Claim 6]The biodegradable hologram brittleness seal according to claim 1 or 2, wherein said reflexivity thin film layer 5 is a light impermeability nature thin film.

[Claim 7]The biodegradable hologram brittleness seal according to claim 1 being a light transmittance state thin film in which said reflexivity thin film layer 5 has a different refractive index from said hologram formation layer 4.

[Claim 8]The biodegradable hologram brittleness seal according to claim 2 being a light transmittance state thin film which has a refractive index in which said reflexivity thin film layer 5 differs from the plastic film (base material) 1 which has said biodegradability.

[Translation done.]

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the hologram which used as the base material the plastic film which has the biodegradability which can do a clear picture, While especially the hologram brittleness seal of this invention has security nature high as a truth distinction seal about the hologram seal which forms the brittle hologram which a hologram sticks and makes the forgery by substitute etc., or an alteration difficult, It is related with the environment-friendly biodegradable hologram brittleness seal which used discarding treatment is easy for, does not have worries about the public nuisance by discarding treatment, and does not have an adverse effect in natural environment.

[0002]

[Description of the Prior Art]While development of the hologram image using interference of the light which can reproduce a stereoscopic picture is furthered and this hologram requires advanced production technology in recent years, Since it can form in various gestalten, for example, label sealing, and foil form, apply this and as a forgery prevention means A videocassette, It is used sticking on the parts of a compact disk, sporting goods, brand-name goods, a ROM board (electronic signal information storage objects, such as a floppy disk), etc., and is used as a sealing layer of further various kinds of packages.

[0003]This hologram can judge [ a genuine article or ] whether it is forgery at a glance, and moreover, since manufacture is difficult, it is used widely [ because of grant of security nature ] as an object for forgery prevention.

[0004]A three-dimensional picture is acquired, and since there is also a high grade feeling, each hologram product is widely used for common goods.

[0005]The support material of the hologram product currently used as these hologram products, especially label sealing, etc., It is what was manufactured from the almost transparent plastic film (or sheet), For example, synthetic resins, such as a transparent polyethylene terephthalate film, polyvinyl chloride, polyester, polycarbonate, poly methyl methacrylate, polystyrene, and polypropylene, and a natural resin are used.

[0006]It is removed after the hologram seal using the above support materials is stuck on an article, The stratum disjunctum and base material which were formed between a base material, a hologram layer, or these so that it might not be abused, Or like the hologram brittleness seal which there are some by which the whole hologram is destroyed when it is made to exfoliate in a hologram layer and intentionally is made

to exfoliate from adherend, and is indicated by JP,5-48210,Y, The stratum disjunctum of pattern state is formed between the base material and the hologram formation layer, and when it tries to remove an after-covering hologram from an end, there are some in which a base material and a hologram formation layer exfoliate.

[0007]

[Problem(s) to be Solved by the Invention]However, a former complete destruction type hologram brittleness seal may make the whole hologram seal exfoliate thoroughly, without destroying a hologram layer and a reflexivity thin film layer depending on how to remove. Therefore, although methods of destroying a hologram layer and the reflexivity thin film layer itself include the latter method, Since the stratum disjunctum of pattern state is provided on the hologram formation layer and the reflexivity thin film layer if it sees where a hologram brittleness seal is stuck by this method, It can distinguish existence of the pattern by viewing, and it not only affects how to seem to be a reproduced image of a hologram, but has the problem that existence of a forgery prevention measure will change clearly.

[0008]The conventional plastic hologram seal is discarded as it is together with the article, without being removed suitably or being removed, after using it, having stuck on various articles.Although discarding treatment is discarded by processing of incineration or reclamation, at present, High temperature-ization of incineration temperature [ in / in especially the discarding treatment of a plastic / incineration ] takes place, Therefore, since there are a problem of the endurance of an incinerator, a problem which there is a pollution problem by combustion gas etc., does not decompose into the soil in reclamation processing, but exists with a prototype, etc., If it remains having remained in soil as waste semipermanently and neglected by natural environment, in addition to the problem of a fine sight, the influence on a living organism will also become serious.

[0009]Then, this invention was made that the above-mentioned problem should be solved, and is \*\*\*\*. The purpose is a hologram brittleness seal which can prevent a stick substitute of the hologram seal by an exfoliation act, It is hard to discover the existence of a layer which carries out a brittle fracture selectively especially, and becomes completely unreproducible by exfoliation, and, moreover, discarding treatment is providing an easy biodegradable hologram brittleness seal.

[0010]

[Means for Solving the Problem]In order to attain the purpose, according to the invention of the 1st of this invention, it is transparent and has biodegradability (a number average molecular weight). let a copolymer of polylactic acid which is 10,000-100,000, and hydroxy acid be the main ingredients -- on the film (base material) 1, It is a biodegradable hologram brittleness seal forming the wrap brittleness stratum disjunctum 6 and the glue line 7 one by one at least for at least a part of stratum disjunctum 2, the transparent hologram formation layer 4 and the reflexivity thin film layer 5 which have the hologram pattern 3, and said reflexivity thin film layer.

[0011]According to the 2nd invention, transparent biodegradability which fabricates the hologram pattern 3 to one field on the polylactic acid film (base material) 1 which it has The reflexivity thin film layer 5, It is a biodegradable hologram brittleness seal forming the wrap brittleness stratum disjunctum 6 and the glue line 7 for said at least a part of reflexivity thin film layer.

[0012]The transparent hologram formation layer 4 in which an invention concerning the 1st invention has

said hologram pattern 3 consists of solvent solubility biodegradable resin.

[0013]An invention concerning the 1st or 2nd invention formed the printing layer 8 in a field of either of the polylactic acid films 1 which has biodegradability by said transparency.

[0014]An invention concerning the 1st invention formed the printing layer 8 in one field of said hologram formation layers 4.

[0015]An invention concerning the 1st or 2nd invention is characterized by said reflexivity thin film layer 5 being a light impermeability nature thin film.

[0016]An invention concerning the 1st invention is characterized by said reflexivity thin film layer being a light transmittance state thin film which has a different refractive index from said hologram formation layer 4.

[0017]An invention concerning the 2nd invention is characterized by being a light transmittance state thin film which has a refractive index in which said reflexivity thin film layer 5 differs from the plastic film 1 which has said biodegradability.

[0018]

[Embodiment of the Invention]This invention is transparent and has biodegradability (a number average molecular weight uses as the main ingredients the copolymer of the polylactic acid which is 10,000-100,000, and hydroxy acid). On the film (base material) 1, It is a biodegradable hologram brittleness seal forming the wrap brittleness stratum disjunctum 6 and the glue line 7 one by one at least for at least a part of stratum disjunctum 2, the transparent hologram formation layer 4 and the reflexivity thin film layer 5 which have the hologram pattern 3, and said reflexivity thin film layer.

[0019]

[Function]Brittle stratum disjunctum is formed in the undersurface of a reflexivity thin film layer in this invention.

Therefore, the existence recognition is difficult and produces a partial brittle fracture from the exterior after seal attachment in a hologram to exfoliation by intentionally.

A hologram reproduced image cannot receive the influence by existence of brittle stratum disjunctum, and forgery prevention nature and alteration tightness can be raised.

[0020]formation of a printing layer has an effect which improves fanciness -- in addition, since exfoliation breaks selectively like a hologram, forgery prevention nature and alteration tightness can be raised.

[0021]While being able to aim at improvement in fanciness further, without spoiling pictures, colors, etc., such as a design of the ground of the body to be stuck, a pattern, and a character, by considering it as the light transmittance state thin film layer which has a refractive index which is different from a hologram formation layer in a reflexivity thin film layer, forgery prevention nature and alteration tightness are also high. Especially the biodegradable hologram brittleness seal of this invention, Since it constituted from a film which has transparent biodegradability, and a hologram formation layer which has biodegradability, When using it for forgery prevention, the prevention from an alteration, and the general purpose (usual use as a seal) under ordinary environment, Similarly to the hologram seal using the plastic material which is not the conventional biodegradability, While it has the endurance and the water resisting property to a shock, \*\*\*\*\*, etc. from the outside, chemical resistance, etc. and security nature, such as forgery prevention and prevention from an alteration, improves from the conventional hologram seal, In the discarding treatment after use, if it reclaims land in soil and discarding treatment or discarding treatment in compost is carried

out, the whole seal will break because a base material and a hologram formation layer decompose by operation of a microorganism, and it will be eventually decomposed into water, carbon dioxide, methane, etc.

[0022]formation of a printing layer has an effect which improves fanciness -- in addition, since manufacture is difficult, forgery prevention nature and alteration tightness can be raised.

[0023]The biodegradable hologram brittleness seal of this invention can use together the biodegradation processing by reclamation processing into soil, and the incineration processing by a combustion furnace, and when carrying out incineration processing, incineration processing of it can be carried out with the combustion heat of low calorie content.

[0024]

[Example]Hereafter, the biodegradable hologram brittleness seal of this invention is explained in detail according to a drawing.

[0025]Drawing 1 is a sectional view showing the composition of the biodegradable hologram brittleness seal in one example of this invention.

It is transparent, and in order to make it easy to exfoliate in a brittle seal, the stratum disjunctum 2 is formed in the undersurface of the plastic film (base material) 1 which has biodegradability.

[0026]The transparent hologram formative layer 4 is formed under said stratum disjunctum 2.

[0027]Said hologram formation layer 4 equips the 4th page of the hologram formation layer of an opposite hand with the hologram pattern 3 in said biodegradable polylactic acid film (base material) 1.

[0028]The reflexivity thin film layer 5 is formed in said hologram formation side of vacuum deposition, sputtering, etc. from the 3rd page of said hologram pattern up. Said hologram formation side can be formed by carrying out the heating press of the press version made from nickel in which the detailed uneven pattern which constitutes a relief type hologram was formed on the hologram formation layer 4. When it has a hologram pattern on the hologram formation layer 4 surface in this way, For example, the grating hologram etc. it was made to have detailed uneven shape by the diffraction grating (grating) by a rainbow hologram, two beam interference, or an electron beam (EB) are applicable.

[0029]The brittle stratum disjunctum 6 formed so that at least a part might be covered is formed in said reflexivity thin film layer 5. Although the glue line 7 is formed on it and a graphic display is not carried out to this glue line 7, temporarily sticking of the exfoliation of the release sheet which coated mold-release characteristic resin, such as silicon resin, on substrate sheets, such as paper, is made possible.

[0030]Base material 1 material of the biodegradable hologram brittleness seal of this invention is a film which fabricates a sheet by T-die melt extruding using polylactic resin (the Shimadzu Corp. make, trade name "Lacty") and by which biaxial stretching was carried out.

The transparency of a film is excellent and the light transmittance of the film which is 40 micrometers in thickness is not less than 94%.

[0031]In the polylactic acid film which has the above-mentioned biodegradability, if the transparency of a film does not influence, various fillers can be added. It is possible to add nondegradable substances, such as various additive agents and polymer. However, since resolvability and physical properties fall remarkably, the problem of processing arises and transparency falls, it is not preferred to add a

nondegradable substance not less than 10%.

[0032]Although it is [ base material / 1 / by a biodegradable film ] usable in a 10-100-micrometer-thick transparent film, 20-70 micrometers of thickness are the optimal.

[0033]The stratum disjunctum 2 is a layer provided in order to make convenient exfoliation of a hologram formation layer and a reflexivity thin film layer. Since it will interfere with exfoliation if the adhesive strength of this stratum disjunctum is too strong or too weak, the presentation of stratum disjunctum and control of thickness are dramatically important. In the case of this invention, the constituent which consists of the following compounding ratios is formed of micro gravure coating at the drying temperature of 110 \*\*, and 0.2-1 micrometer in thickness.

15 copies of presentation acrylic resins of stratum disjunctum (Mitsubishi Rayon Co., Ltd. make and die YANARUBR80) Methyl ethyl ketone (made by TOYO INK MFG. CO., LTD.) 55 copies Toluene (made by TOYO INK MFG. CO., LTD.) 30 copies[0034]In the case of a relief type hologram, the hologram formation layer 4 has a good embossing moldability, for example, The constituent which it is hard to produce press unevenness, and a bright reproduced image is obtained, and resin with a good adhesive property with the biodegradable plastic film 1, the hologram formation layer 4, and the reflexivity thin film layer 5 is required, and consists of the following compounding ratios by the photogravure method. It is formed at the drying temperature of 110 \*\*, and 1.0 micrometer in thickness.

Presentation polylactic resin of a hologram formation layer (made by Toyobo Co., Ltd.) 25 copies Methyl ethyl ketone (made by TOYO INK MFG. CO., LTD.) 20 copies Toluene (made by TOYO INK MFG. CO., LTD.) 25 copies again, To the hologram formation layer 4 of such a constituent, a hologram formation side makes printing plate temperature of the press version 120-150 \*\*, and is formed by press.

[0035]As the hologram formation layer 4, the resin which has the biodegradability of PORIKA plaque ton (PCL) resin etc. can be used except polylactic resin, Resin, polycarbonate resin, polystyrene resin which do not have biodegradability, Thermoplastics, such as polyvinyl chloride resin, unsaturated polyester resin, Melamine resin, an epoxy resin, urethane (meta) acrylate, polyester (meta) acrylate, Epoxy (meta) acrylate, polyol (meta) acrylate, Thermosetting resin, such as melamine (meta) acrylate and triazine (meta) acrylate, Or it is usable if these mixtures, the thermoforming nature material which has a radical polymerization nature unsaturation group further, etc. are the materials in which it blends with biodegradable resin and things other than the above also have the stability which can form a hologram image usable.

[0036]The reflexivity thin film layer 5 is a layer which reflects incident light, and 100-nm-thick aluminum is formed by the vacuum deposition method. Otherwise as the reflexivity thin film layer 5, it is usable in silver, gold, tin, and titanium nitride (TiNx). In this case, since it is very difficult to recognize that the brittle stratum disjunctum 6 mentioned later exists under a thin film layer, forgery prevention nature can be raised.

[0037]The brittle stratum disjunctum 6 formed so that at least a part of reflexivity thin film layer 5 might be covered, When a hologram brittleness seal is exfoliated after attachment of a hologram brittleness seal, It is provided, in order that the interface of the brittle stratum disjunctum 6 and the reflexivity thin film layer 5 may exfoliate or the brittle stratum disjunctum 6 may flip the glue line 7, and it is formed by offset printing or screen printing other than gravure, etc. This brittle stratum disjunctum 6 is possible also for being provided in a part of reflexivity thin film layer 5, and providing so that messages, such as a character and a mark,



may be expressed, and although that shape is arbitrary, it requires that that it is in the state which exfoliated unjustly should enable it to distinguish a hologram clearly.

[0038]The brittle stratum disjunctum 6 is formed at the drying temperature of 110 \*\*, and 0.5 micrometer in thickness by the photogravure method in the constituent which consists of the following compounding ratios, for example.

Presentation acrylic resin (Mitsubishi Rayon Co., Ltd. make and die YANARUBR80) of brittle stratum disjunctum 30 copies Methyl ethyl ketone (made by TOYO INK MFG. CO., LTD.) 40 copies Toluene (made by TOYO INK MFG. CO., LTD.) 40 copies Methyl isobutyl ketone (made by TOYO INK MFG. CO., LTD.) 20 copies[0039]As the glue line 7, the constituent which consists of the following compounding ratios is formed at the drying temperature of 110 \*\*, and 20 micrometers in thickness by the photogravure method. 30 copies of presentation acrylic pressure sensitive adhesive of a glue line (the TOYO INK MFG. CO., LTD. make, Oliva Inn) Methyl ethyl ketone (made by TOYO INK MFG. CO., LTD.) 50 copies Toluene (made by TOYO INK MFG. CO., LTD.) 50 copies in addition, If the reflexivity thin film layer 5 and the brittle stratum disjunctum 6 otherwise are not deteriorated or it does not risk as the glue line 7, it may usually be used and an isobutylene-isoprene-rubber system, a crude rubber system, a silicon system, and a polyisobutyl system will be mentioned as adhesion components, but it is not the limitation. Alkyl methacrylate, vinyl ester, acrylic nitril, Additive agents represented by a condensation ingredient, unsaturated carboxylic acid, a hydroxyl content monomer, acrylic nitril, etc. to which styrene, a vinyl monomer, etc. are mentioned, such as a refining ingredient, a polymerization initiator, a plasticizer, a hardening agent, a hardening accelerator, and an antioxidant, can be added if needed.

[0040]Drawing 2 is a sectional view showing the composition of the biodegradable hologram brittleness seal concerning the 2nd invention.

The undersurface of the film (base material) 1 which has transparent biodegradability is equipped with the hologram pattern 3.

That is, it is the feature to emboss directly to a biodegradable plastic film and to form a hologram.

[0041]The hologram pattern 3 is formed in one side of the plastic film 1 in which a biodegradable hologram brittleness seal has biodegradability. The reflexivity thin film layer 5 is formed of vacuum deposition, sputtering, etc. under this hologram pattern. About formation of this hologram pattern 3, the press board made from nickel with which the detailed uneven pattern which constitutes a relief type hologram was formed can be formed in said film by carrying out heating press. When it has a hologram pattern on this hologram pattern 3 surface, the grating hologram etc. it was made to have detailed uneven shape, for example by the diffraction grating (grating) by a rainbow hologram, two beam interference, or an electron beam (EB) can be applied. When carrying out extrusion molding of the biodegradable plastic film 1, EBOSU can also be carried out directly.

[0042]Drawing 3 is a sectional view showing an example of a biodegradable hologram brittleness seal which provided the printing layer with respect to the 1st and 2nd inventions. The biodegradable hologram brittleness seal of this invention is formed under the hologram formation layer 4 and said hologram formation layer under the plastic film (base material) 1 which has biodegradability in order of the printing layer 8, the reflexivity thin film layer 5, the brittle stratum disjunctum 6, and the glue line 7. The printing layer 8 prints patterns, such as a character and a mark. As a printing method, there are methods other than gravure printing, such as offset printing and screen-stencil. The ink composition which a printing layer

becomes, for example from the following compounding ratios is formed at the drying temperature of 100 \*\*, and 1.0 micrometer in thickness by gravure.

Ink composition polyester resin (the Toyobo Co., Ltd. make, Byran 200) of a printing layer 25 copies Carbon black Eight copies Methyl ethyl ketone (made by TOYO INK MFG. CO., LTD.) 70 copies Toluene (made by TOYO INK MFG. CO., LTD.) 30 copies[0043]The reflexivity thin film layer 5 in the biodegradable hologram brittleness seal of this invention is a layer which reflects incident light, and 10-100 nm in thickness or aluminum beyond it is formed by the vacuum deposition method. As a reflexivity thin film layer, metal or metallic compounds, such as silver, gold, zinc sulfide, and tin, can be used for others. [0044]It is possible to provide the penetrable thin film layer which has a different refractive index from a hologram formation layer as a reflexivity thin film which has transparency in the reflexivity thin film layer 5. This penetrable thin film layer produces the light reflex in an interface from refractive index difference with a hologram formation layer while showing a light transmittance state, and it is used for reproduction of the hologram image of a hologram formation side. For example, it forms by vacuum evaporation of a vacuum deposition method etc. as a thin film layer which consists of 50-nm-thick ZnS. According to this, reproduction of a hologram can view with pictures, colors, etc., such as a design of the ground of adherend, a pattern, and a character, and improvement in much more fanciness can be aimed at. As a penetrable thin film layer, it is preferred to improvement in fanciness that a refractive index is higher than the hologram formation layer 4 (refractive index  $n = 1.3-1.6$ ).

[0045]It is preferred that membrane formation means other than a vacuum deposition method, such as sputtering process and the ion plating method, can be applied, and it is in the range of 10-1000 nm as thickness as a method of forming such a penetrable thin film layer.

[0046]Drawing 4 is a sectional view showing the application of the biodegradable hologram brittleness seal of this invention. On the surface of the plastic card which becomes drawing 4 from substrates, such as VCM/PVC, an acrylic, polycarbonate, and ABS. After sticking a hologram brittleness seal, when it exfoliates compulsorily, it is what showed signs that a hologram brittleness seal was destroyed, and there is a part of hologram remaining which exfoliated from the portion of the brittle stratum disjunctum 6 according to this, and exfoliated in the surface of separation, and it will be in an unreproducible state.

[0047]When the biodegradable hologram brittleness seal manufactured by the method beyond <the decomposition test 1> was put into the electromotive refuse disposal machine (made by Hitachi) and the decomposition state was observed periodically, the seal became cloudy three months afterward, and partial decomposition was obtained although shape was held. It decomposed nearly thoroughly and after six-month progress changed into the state where the check of shape cannot be performed.

[0048]The hologram seal using the plastic film (PET) (the Toray Industries, Inc. make, "trade name lumiler") as a <decomposition test 2> comparative example, After six-month progress, when it put into the electromotive refuse disposal machine by the same method as an example and the decomposition state was observed periodically, although some plastics base materials were colored yellow, shape was held and not being decomposed was checked.

[0049]The comparison result of the hologram seal of a <evaluation> comparative example and the biodegradable hologram brittleness seal of this invention proved that the biodegradable hologram brittleness seal of this invention is as outstanding \*\*\*\*\*.

[0050]

[Effect of the Invention]As stated above, a biodegradable plastic is used in this invention.

Therefore, having the forgery prevention nature of the conventional hologram seal, a fine sight, and high-class nature, discarding treatment after seal use can be performed simply, and the outstanding hologram brittleness seal which does not have an adverse effect on earth environment is provided.

That is, after attachment of a biodegradable hologram brittleness seal, even if it sees from the surface of a seal, by providing the layer which brings about a partial brittle effect under a reflexivity thin film layer, the check of the existence can be made very difficult and forgery prevention nature can be raised.

Improvement in fanciness can be aimed at further, without spoiling pictures, colors, etc., such as a ground design of adherend, a pattern, and a character, by considering it as the penetrable thin film layer which has a refractive index which is different from a hologram formation layer in a reflexivity thin film layer. Much more forgery prevention nature and alteration tightness can be raised by providing a printing layer by being able to improve fanciness and being destroyed selectively [ it is the same with a hologram and ] to an exfoliation act. Since the film which has the outstanding transparency is being used for the biodegradable hologram brittleness seal of this invention, it can see a picture conventionally still clearer than elegance.

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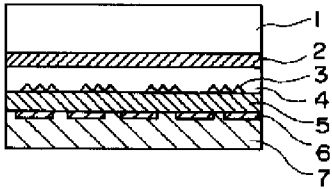
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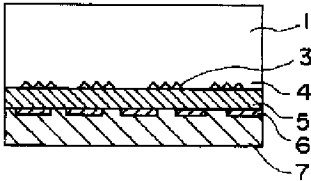
## DRAWINGS

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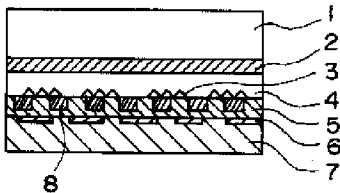
[Drawing 1]



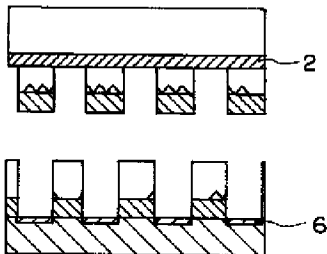
[Drawing 2]



[Drawing 3]



[Drawing 4]



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